

Traffic Analysis and Highway Capacity

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Abstract - Capacity evaluation of the Road (A case study on capacity evaluation of the Shirol bypass Road Kolhapur SH-166 lane dual carriage way) which is start from KPT and end at Nandani chowk Kolhapur the capacity of any location is define based on transverse of the vehicles at that point which is select for the research. The capacity of a road is impact by the number of lanes, width of lane, width gradient, the total population of that area and depend on the type of area that means if it is industrial area then automatically the capacity is more because of commercial vehicles as well as personal vehicles. With the help of Passenger Car Unit (PCU) the capacity is expressed. In India due to heterogeneous traffic and the movement of vehicles is not in discipline lane it is not easy to study and analysis the traffic.

Key Words: Traffic capacity, speed, traffic flow

1. INTRODUCTION

Traffic flow studies are accompanied to determine the number, movement, and type of vehicles at a given location. Traffic flow analysis helps to improve the capacity of flow. Traffic flow analysis also helps to reduce the accident level. Traffic flow concepts to also describe in the mathematically way the interaction between vehicles and driver The concept of traffic flow is a relationship between vehicles, drivers and type of infrastructure like highways, expressways, signals and devices which is install to control the traffic flow. The main purpose of understanding the traffic network is to help to reduce the traffic congestion. Due to increasing of population and transportation day by day the traffic +volume is increase to reduce this traffic we need to use some new technology which are discuss in this research Use the enter key to start a new paragraph. The appropriate spacing and indent are automatically applied Traffic flow principle always represents in mathematically. It is always described the interaction between vehicle and the driver. So in my thesis "traffic analysis and highway capacity of sh-166 I will analysis the traffic and highway capacity In this I basically I am studying about traffic at Shirol bypass road and design a new type of carriageway that will to flow the traffic smoothly and as well as safely. I will suggest some important requirement which is very important to reduce the travel time and provide smooth and safe movement for traffic flow and for evaluating the capacity of the road I

choose the manual survey method and surveyed the road for one week and find the total volume of the traffic in the 7 days of week with peak and non- peak hour. It is usual to use volume and flow rate to measure the number of vehicles passing a point over a given point or section of a lane during a given time interval. Volume is the number of vehicles that pass a point for the duration of one hour. On the other hand, flow rate denotes the number of vehicles that pass a point through a time interval of less than 1 h n many industrialized nations today. Highways present engineers and governments with formidable challenges relating to safety, sustainability, environmental impacts, congestion mitigation, and deteriorating infrastructure.

As a result, highways are often viewed from the perspective of the many challenges they present as opposed to the benefits they provide. Historically, highways have always played a key role in the development and sustainability of human civilization. Today, in the India and throughout the world, highways continue to dominate the transportation system, by providing critical access for the acquisition of natural resources, industrial production, retail marketing, and population mobility. The influence of highway transportation on the economic, social, and political fabric of nations is far- reaching and, as a consequence, highways have been studied for decades as a cultural, political, and economic phenomenon. While industrial needs and economies forces have early played an important part in shaping highway networks, societies' fundamental desire for access to activities and affordable land has generated significant highway demand, which has helped define and shape highway networks. Given the above, the focus of highway engineering has gone from one of network expansion to one that addresses issues relating to infrastructure maintenance and rehabilitation, improvements in operational efficiency, various traffic-congestion relief measures, energy conservation, improved safety, and This shift has forced a new emphasis in highway capacity and traffic analysis.

2. OBJECTIVE

The main objective of this research is to analysis the traffic at KPT Chowk and NANDANI Chowk and suggests further improvement which is required to flow the traffic smoothly

and easily. Some objectives are to be study which is given below:

1. To collect the data which was occur between KPT Chowk to NADANI Chowk from PWD office.
2. To analyze the traffic volume at KPT Chowk and NADANI Chowk and evaluate the total PCU at both site.
3. After analyze the traffic volume we are able to evaluate the factor that affect the congestion. And count manually and automatically.

3. METHODOLOGY

The research stage started from literature study, data collection, data analysis ,and result in the form of conclusion and recommendation for handling, with a literature study, which the identified the problem that caused traffic jam on Shirol bypass road , the stage is carried out to find out the role root of problem that occur area study.

Data Name	Research data		
	Type of data	Collection tech	Uses of data
The width of road	Primary data	Observation	System identification
Travel time	Primary data	Observation	Determine the speed
Traffic volume	Primary data	Manually count	Traffic fluctuation
Total population	Secondary data	Study of Literature	Size of city

A) Data Analysis: In analyzing data, the process begin with calculating the performance of road section based on RICC 1976.what is calculated is the road capacity(1), degree of saturation(2) and vehicle speed and capacity analysis and v/c ratio are carried out by analyzing traffic in both direction on route.in accordance with the Indian road construction corporation limited.

FORMULA. $C = C_0 \times FC_1 \times FC_{pa} \times FC_{sh} \times FC_k$

Where:

C= Capacity (vehicle unit/hour) C_0 = Basic capacity

FC_1 = Capacity adjustment factor to lane width or traffic lane
 FC_{pa} = Capacity adjustment factor to separation of direction
 FC_{sh} = Capacity adjustment factor to shoulder or curved road
 FC_k = Capacity adjustment factor to city size $DS = V/C$.

4. DATA COLLECTION

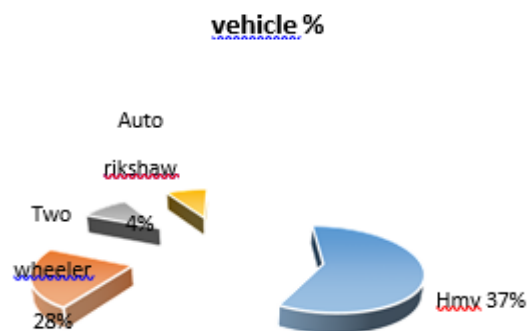
The study site is located along the shirol bypass road KPT To Nadani patta It is a tow-lane, divided urban road where a traffic condition prevails. One way (1 lane road) roadway width is 8 m. The parameters evaluated in this study are the classified count, speed and headway. The data was collected for one hour in the daily (AM 5:00 to 6:00 PM).



Photo located at study site

Vehicle composition in percentage

Tow wheeler%	Auto rikshaw%	Lmv %	Hmv %
28%	4%	31%	37%



Where:

D_s = Degree of saturation V = Traffic volume

C = Capacity

L = Length of road

$U_s = 1$

$n \sum t_i$

n = Number of vehicle sample t_i = Travel time

5. LITERATURE REVIEW:

The study of traffic flow analysis is an interface between driver, vehicles and infrastructure of the roadway. The main purpose of traffic flow analysis is analyse a new idea to control the traffic flow and able to understand the road network by a common person. In also help to reduce the traffic jam and save the precious time of everyone.

Literature review S.Yamuna 2014

Author expressed in his research some of the fundamental traffic flow according to the behavior of transportation system. The main purpose the author is to define the feature of the traffic flow according to the speed of the vehicle and flow of traffic. Basically, the heterogeneous traffic is in urban areas. The main purpose of the author is to evaluate the headway of the traffic and modelled a wide range of traffic flow for the vehicles Guidelines for Capacity of Urban Roads in Plain Areas - IRC106 (1990): This code recommends PCU values for various types of vehicles in urban roads and explains level of service criteria for urban roads. Vehicle Class wise Quantification and Headway Analysis under Heterogeneous Traffic (Kanagaraj et al., 2011). This paper aims to develop and analyze class wise time gap and following headway distribution models for different lead-lag pairs in mixed traffic using data from urban roads in Chennai. Headway distribution of heterogeneous traffic in urban arterials (Arasan and Koshy, 2003). This paper describes an attempt made to study the time- headway distribution of urban heterogeneous traffic over a wide range of flow levels. The importance of a systematic procedure for grouping of headway data through appropriate choice of class interval has been studied. Arasan and Akthari (2011) studied traffic flow characteristics on intercity highways using computer simulation. This paper covers data collection and speed-flow relationships for intercity highway.

6. RESULT:

Shirol bypass road is one of the densely populated roads with many types of vehicles, this is because this road is connecting to city center of shirol. On this road there are MIDC, market, hotels, fuel station, shop, other activity level greatly affect the smooth running of the road transportation. the area around this section is dense with motorized vehicles entering/ exiting the side of the road. This is what often causes congestion so that traffic jams often on the shriol bypass road.

Based on table 1 the types vehicles that dominate the traffic flow on the KPT chowk. Followed by light vehicle then heavy vehicle this data use in table.

Table 1. Traffic Flow Hourly

time	Two-wheeler	Auto rikshaw	Taxi/ car	Gov bus	Truck/ tanker	tractor
7:8	45	25	47	25	16	12
8:9	35	12	56	20	14	16
9:10	125	35	59	15	15	20
10:11	165	32	74	15	35	23
11:12	135	20	65	15	47	16
12:13	98	15	49	15	25	10
13:14	109	23	53	15	38	9
14:15	96	25	50	15	39	6
15:16	158	35	56	14	51	8
16:17	175	46	75	20	42	7

Table 1. Traffic flow graph chart

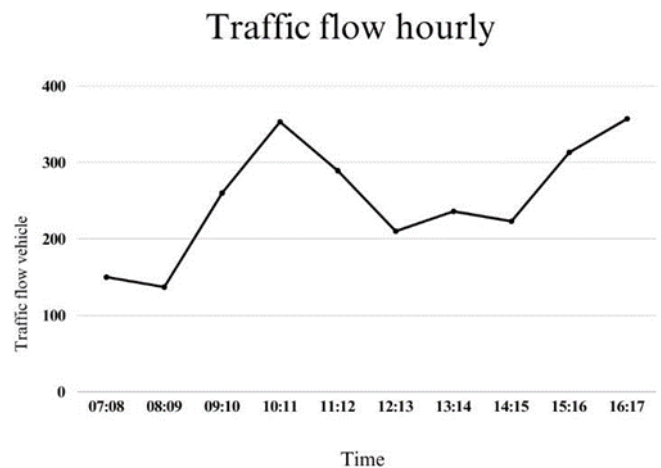


Table 1.2. Mean Speed & Vehicle Density Hourly

Time	(km/h)	Traffic flow	Density (vehicle/km)
7:8	24	175	8
8:9	19	137	7
9:10	28	260	9
10:11	40	386	10
11:12	40	295	8
12:13	50	225	6
13:14	45	265	7

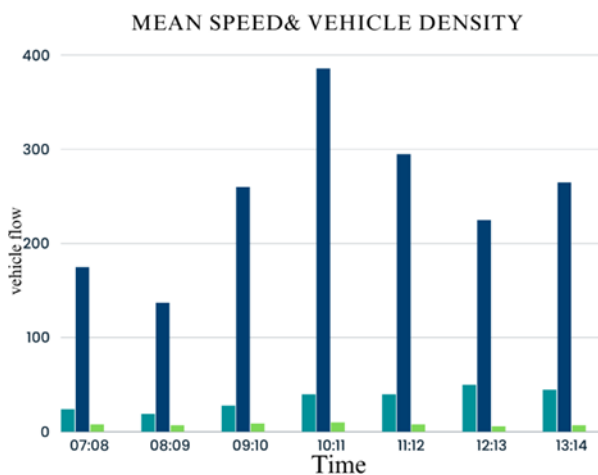


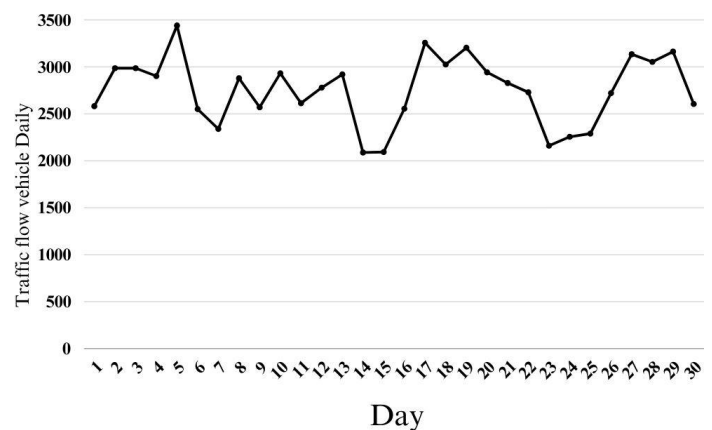
Table 2. Traffic Flow Monthly (07:00. Am To 06:00. Pm)

Day	Two wheel	Auto	Taxi / Car	Gov Bus	Truck /tanker	Tractor	Total
1	1141	238	584	169	322	127	2581
2	1456	175	652	156	452	95	2986
3	1320	102	780	170	450	80	2986
4	1562	145	984	162	512	75	2902
5	1010	98	698	159	489	96	3440
6	950	89	589	172	471	68	2550
7	1213	106	845	160	482	72	2339
8	987	112	753	160	493	65	2878
9	1472	132	621	156	461	89	2570
10	1256	144	540	156	452	65	2931
11	1596	78	456	156	434	58	2613
12	1654	56	589	148	414	58	2778
13	850	98	654	152	256	78	2919

14	989	78	421	154	369	82	2088
15	1234	87	365	142	632	94	2093
16	1567	123	820	149	524	73	2554
17	1432	156	764	147	465	61	3256
18	1324	147	786	147	741	58	3025
19	1254	159	678	150	645	56	3203
20	1354	165	456	150	634	69	2942
21	1456	50	389	145	656	33	2828
22	969	68	391	147	526	59	2729
23	987	89	483	158	453	85	2160
24	945	109	598	160	400	77	2255
25	1256	118	612	160	501	73	2289
26	1289	139	902	150	523	50	3134
27	1278	148	732	147	526	45	3053
28	1103	210	745	158	452	42	2876
29	1126	178	635	170	435	61	3162
30	1430	231	409	172	650	60	2605

Table2. Traffic Flow Daily Chart

Traffic flow Daily



6. CONCLUSION

Based on the results of traffic characteristics and traffic performance of shirol bypass road which have discussed, it can be concluded that:

Shirol bypass road peak traffic hours at 09:00 am with capacity 260 light vehicle 450 vehicle unit so that the value of v/c ratio the relation between traffic flow and traffic density Find out the relation between speed and traffic density is that if density increases, speed will decrease The relationship between v/c ratio and traffic density is that as

the traffic density increases, the v/c ratio for the road get worse. The relation between traffic flow and traffic density Find out the relation between speed and traffic density is that if density increases, speed will decrease. The relationship between v/c ratio and traffic density is that as the traffic density increases, the v/c ratio for the road get worse.

7. REFERENCES

- [1]. Dr.L B ZALA (2014) "Traffic flow characteristics for the heterogeneous traffic on urban road" BVM Engineering College, Gujrat, India.
- [2]. Geetam Tiwari (1999) "Road Design for Improving Traffic Flow" INDIAN INSTITUE OF TECHNOLOGY, Delhi, India.
- [3]. Babitha Elizabeth Philip (2014) "Traffic flow Modelling and study of Traffic Congestion" Toc H Institute of Science and Technology, Keral, India.
- [4]. Geetam Tiwari (2003) "Traffic Flow and safety in new models for Heterogeneous Traffic"
- [5]. S.Yamuna (2014) "Study of Traffic flow characteristics for heterogeneous traffic", Rajeev Gandhi Memorial College of Engineering and Technology, Nandyal, Andhra Pradesh, India.
- [6]. Shekhar K.Rahane (2014) "Traffic congestion causes and solution: A study of Talegaon Dabhade city" Dr.D.Y. Patil Institute of Engineering and Technology Ambi, University Of Pune, Maharashtra, India.
- [7]. E.Elangaon (2015) "Study on Traffic flow characteristics using Probe Vehicles" Division of Transportation Engineering, Anna University, Chennai